DOCUMENT RESUME

ED 241 348 SE 044 273

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TITLE Dolciani vs. Saxon: A Comparison of Two Algebra I Textbooks With High School Students.
INSTITUTION Oklahoma City Public Schools, OK. Dept. of Planning, Research, and Evaluation.
PUB DATE [84]
NOTE 36p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Algebra; Drills (Practice); Educational Research; *Homework; *Mathematics Instruction; Problem Solving; Secondary Education; *Secondary School Mathematics; *Teaching Methods; *Textbook Research; Textbooks
IDENTIFIERS *Mathematics Education Research

ABSTRACT

This study examined achievement differences between algebra students taught with the non-traditional textbook developed by Saxon and those taught with a "traditional" textbook by Dolciani. Student absences, rate of turning in homework, and ability level were considered, as well as teachers' comments. One Algebra I section in each of seven schools used the Saxon text, while a second section in each school used the Dolciani text, with the same teacher teaching both sections. In an eighth school, the texts were used with two sections of Elementary Algebra students. (However, data from these two classes and from one of the seven Algebra I teachers were not used in the analysis.) An analysis-of-covariance design accounted for students' initial achievement level differences prior to entering Algebra I. The Spring, 1981, California Achievement Test total math score was used as a covariate. The locally-constructed Algebra I Comprehensive Exam assessed course achievement. The mean score of the 98 students using the Saxon text was significantly higher than the mean score of the 67 students using the Dolciani text. The Saxon classes had slightly more absences and turned in homework slightly less frequently than the Dolciani classes. Most teachers preferred the Saxon text. An addendum discusses inter-test correlation and data from the California Achievement Test. (MNS)

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DOLCIANI VS SAXON: A COMPARISON OF TWO ALGEBRA I TEXTBOOKS WITH HIGH SCHOOL STUDENTS

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SE044273

ACKNOWLEDGEMENTS

A special word of thanks is extended to the teachers who participated in the study. Without their time and effort this report would not have been possible.

Robert Browning	Capitol Hill
Jeanette Ceasar	Northeast
Betty McCauley	Classen
A.C. Smith	Southeast
Ruth Aillo	Star Spencer
Dean Choate	Grant

I would also like to express my appreciation to my collegues in Planning, Research, and Evaluation for their suggestions regarding the design of the study, and for their assistance in observing classes, interviewing teachers and proctoring exams.

Thanks also go to Pam Wheeler, principal, and Jack Harding, teacher, from John Marshall for their assistance in piloting the Algebra I Comprehensive Exam.

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CHAPTER I

INTRODUCTION

Background

Many changes have occurred in mathematics curriculum during the past fifty years. Prior to the 1950's, mathematics educators emphasized computational skills. Thorndike dominated much of the thinking with his view that: "Learning is essentially the formation of connections or bonds between situations and responses...and that habit rules in the realm of thought as truly and as fully as in the realm of action." (1924). Mathematics educators such as Brownell and Chazal, in reaction to the emphasis on drill, advocated a "meaning theory." The meaning theory emphasized the inner relationships of the number system as well as social uses of arithmetic. Their theory led to the modern mathematics movement of the 1950's and 1960's. The emphasis of modern math was the understanding of the number system. As a result, drill and computational skills were deemphasized. During the 1970's the decline of students' computational skills was, in some opinions, blamed on the modern mathematics curricula. So mathematics curriculum developers again stressed mathematics skill development under the "back to basics"

movement. The meaning theory, however, retained the support of mathematicians. Therefore, the task for mathematics educators during the 1980's seemed to be combining drill with meaningful instruction in order to produce optimal learning.

Recent research regarding algebra textbook variables revealed at least three issues which showed statistical significance in favor of experimental groups. These variables were:

(1) Distributed homework practice & review (Butcher, 1975; Camp, 1973)
(2) Early emphasis on mastery of basic skills (Taylor, 1973)
(3) Fantasy themes, not reality themes, in word problems (Christensen, 1980)

From his experience as an algebra teacher at Oscar Rose Junior College, Saxon identified a need for an algebra textbook that taught the fundamentals of algebra before abstract theory, and that required students to do review problems from previously covered topics in each homework assignment. To provide this kind of algebra textbook, Saxon wrote Algebra I, An Incremental Development. The textbook also included many word problems with imaginative themes.

During the 1980-81 school year, Saxon tested his book in 21 Oklahoma public schools.* An Algebra I teacher at each school taught one section with the Saxon book and one or more with the regular book.

*Carnegie, Cushing, Del City, Holdenville, Lexington, Lindsay, Madill, Marlow, Moore, Oklahoma City (2), Okemah, Okmulgee, Ponca City (2), Purcell, Seminole, Stillwater, Tecumseh, Wetumka, Yukon.

Saxon with the help of the algebra teachers in the study constructed 16 tests on fundamental topics of elementary algebra. These tests were given to the students after the topic had been completed in both books. The students' scores were grouped according to their quartile scores on the California Achievement Test as "low", "low-medium", "high-medium", and "high" ability levels. According to Saxon's analysis of the data, at every ability level on every test, the students with the Saxon book outscored their control counterparts. On all but two tests, the Saxon group solved more than twice as many problems as the control students.

In addition, the spring, 1981, mathematics subtests of the California Achievement Test scores of the Oklahoma City Public School students who participated in the first Saxon study were compared by an analysis of covariance. The spring, 1980, mathematics CAT scores were used as the covariate. There was no difference, however, at the .05 probability level between the Saxon and the control groups. A possible explanation for the lack of significance was that only 8 of the 85 math problems on the CAT addressed algebra concepts. (More details of this study are available upon request from the Planning, Research, and Evaluation Department of the Oklahoma City Public Schools).

The present study was designed to examine the achievement differences between algebra students taught with Saxon and those taught with a traditional algebra text after the initial differences in mathematics achievement level were statistically accounted for. The impact on algebra achievement of students' yearly absences, rate of turning in assigned homework, and algebra class periods missed throughout the year was considered. The differences in algebra achievement between the Saxon taught and the traditionally taught students of high, medium and low ability were also examined. In addition, the advantages and disadvantages of both texts from the teachers' points-of-view were documented.

Evaluation Design and Methodology

Participants

The Algebra I students from the following high schools participated in the study:

Classen
Capitol Hill
Grant
Northeast
Northwest
Star Spencer
Southeast

Students in each school were divided into two Algebra I sections. One section used the traditional textbook, Algebra Structure and Method by Dolciani. The other section used Saxon's text, Algebra I, An Incremental Development. At each school,

the same teacher taught both sections of Algebra I.

The evaluator designated which sections would be taught with Dolciani and which with Saxon texts. Students were not randomly assigned to either section. Efforts were made, however, to balance the sections assigned to each textbook by:

- Time of day the class met
- Equal numbers of upper and lower classmen
- Equal numbers of bilingual students
- Equal numbers of "motivated" students chosen to be in programs such as mini-school and biomedical.

Douglass High School also participated in the study. As Douglass had only one section of Algebra I, however, the study was conducted on Elementary Algebra students. One section of Elementary Algebra used the Saxon text and one section used the traditional elementary algebra text.

The teachers in the study all had teaching experience using the Dolciani textbook. None of the teachers, however, had used the Saxon textbook. Teachers were instructed to participate in the study by the Director of High Schools.

Procedure

Participating teachers attended an inservice during the first week of school. The purpose of the inservice was to give the teachers

an overview of the study and to encourage them to do the extra work involved with using two textbooks simultaneously. The Homework and Attendance Roster was passed out and discussed. Saxon's textbook was not available at the beginning of school. So students were to use zeroxed copies of the book until mid-October. These copies were passed out to teachers during the inservice. Teachers supplied the evaluator with characteristics of the students in each Algebra I section such as the number of upper classmen, bilingual students and students in special programs. The following day the evaluator designated to the teacher which section ws to use the Dolciani textbook and which section was to use the Saxon textbook.

Throughout the year, teachers supplied homework missed and attendance for each student in the study. During January and again in April the evaluator and colleague observed the algebra I classes and interviewed each teacher.

During the second week in May, both Algebra I sections at each school were given the Algebra I Comprehensive Exam. The exam was proctored by the evaluator and other members of the research department. Students were given two hours to complete the test, and, with one exception, all students finished in the allotted time.

Instruments

The following instruments were used in the study.

1. California Achievement Test Mathematics Subtests

The mathematics tests in the CAT covered computational skills, concepts and their applications. The test-retest reliability of the total mathematics subtest ranged from .89 to .93 at the high school level. The total mathematics subtest score from the spring, 1981, testing was obtained to give an estimate of the mathematics achievement level of each student in the study. The score was used as a covariate in an analysis of covariance design to help control for the potential differences in mathematics achievement level between the Saxon and the Dolciani groups.

2. Algebra I Comprehensive Exam

This instrument was a locally developed, criterion-referenced exam. The topics included on the exam were the major areas taught in the Dolciani text and the major areas taught in the Saxon text. The topics are listed below:

-Signed numbers

-Evaluation of expressions

-Solution of equations with one unknown

-Addition of like terms

-Word problems about numbers

-Percent word problems

-Value word problems

-Radical expressions

-Linear equations

-Simultaneous equations

-Scientific notation

-Integral exponents

-Uniform motion problems

-Reciprocals

-Geometry

-Factoring trinomials

-Quadriadic functions and equations

-Greatest common factor

-Inequalities

-Rational numbers (fractions)

-Algebra theory

There were three problems related to each topic on the test with the exceptions of reciprocals which had two and algebra theory which had six problems. The items on the test were examined by the mathematics consultant and found to be representative of both textbooks.

All the topics were covered in both books, although some topics received more emphasis from one text than from the other. Saxon often used different terminology than Doliciani to describe the same concept. The problems were worded in Saxon's way one time and Dolciani's way the next or vice versa. Before the test, students were encouraged to ask for help if they did not understand the wording of a problem.

The problems representing the Saxon book were created to be like those found in the daily homework assignments and from the comprehensive exam developed by Saxon. The problems representing the Dolciani book were made to be like those in the programmed chapter reviews, the cumulative review and the comprehensive test that accompanied the book.

The exam was piloted with a John Marshall algebra I class which was not participating in the study. The results caused the difficulty level of the exam to be lowered. To discourage cheating, two forms of the exam were created by putting the problems in different order.

The exam consisted of six true/false questions and 58 fill-in-the-answer questions. Students were given space on the exam to work each problem. If students set up a problem to be worked correctly but made a math error in their computation, they were given half credit for the problem.

The Algebra I Comprehensive Exam score was the dependent variable in the analysis of covariance design. Each topic on the exam was also analyzed separately.

3. Homework and Attendance Roster

The purpose of this instrument was to collect the absences and homework received throughout the year from each Algebra I student in the study. The number of times each algebra timeblock was missed due to special events such as assemblies was also documented. Teachers turned in a homework and attendance roster each month. The relationship between the dependent variable and homework rate, absences and timeblocks was examined.

4. Saxon Study Teacher Interview Form

Teachers were interviewed in January and again in April. The purpose of the interviews was to learn the following:

- The amount of each textbook covered at the time of the interview
- The topics that students were having particular ease or difficulty mastering in each textbook
- The comparisons of homework assigned between the two classes
- Which text appeared more beneficial to certain types of students
- The strengths and weaknesses of each textbook

Classroom observations and teacher interviews were used to determine how the algebra teachers were using the Saxon and Dolciani texts with their classes. In addition, teachers' impressions of each textbook were documented.

Chapter II

PROCESS EVALUATION

The first teacher interviews were conducted during the last week in January. Information gained from the interview questions is summarized below.

The Saxon textbook was divided into 126 lessons, 16 of which were labeled "additional topics". Also included were four enrichment lessons. The Dolciani textbook was divided into 12 chapters. Each chapter was further separated into 8 to 15 subsections.

At the end of the first semester, the algebra teachers reported covering the first 39 to 63 lessons with the Saxon classes. The Dolciani classes ranged from the middle of the fourth chapter to the beginning of the sixth chapter. So, at the midyear point teachers had covered from a third to approximately half of the material in each textbook. The teachers seemed to espouse one of two positions on classroom pace. One group believed that students should be introduced to every concept covered in the textbook, thinking that students might or might not completely understand a concept before the class moved on to a new topic. They felt, however, that an introduction to each concept during Algebra I would facilitate comprehension of the topic in future mathematics classes. The second group of teachers stated that they believed that most of the students should understand a lesson before they moved on to the next

concept, even at the expense of deleting the introduction of some topics. As a result, some teachers planned to finish the books with their classes while others did not.

Teachers reported that the Dolciani students were having particular difficulty with (1) word problems, (2) fractions with variables and (3) factoring, and particular ease with (1) solving equations and (2) solving inequalities.

Teachers stated that the students in the Saxon classes were having particular difficulty with (1) fractions with variables, (2) equations with fractions, (3) numerous methods to solve negative exponents, (4) substituting variables for other variables. The same students were having particular ease with (1) word problems and (2) solving equations.

The teachers all reported approximately equal amount and difficulty level of assigned homework between the two classes.

The teachers' textbook preferences for each type of student are tallied below:

-the slow student

Dolciani	2
Saxon	4
Either	2

-the average student

Dolciani	1
Saxon	5
Either	2

-the bright student

Dolciani	1
Saxon	6

Teachers' perception of preparation time between the two textbooks was evenly divided. Half the teachers felt that Saxon took more preparation time than Dolciani, and half felt it took less time. Teachers listed the following strengths and weaknesses of the Saxon book.

Strengths

-No hard word problems

-Less frustration with homework

-Explains problems in a variety of clear ways

-Easier to work ahead

-Many good examples

-Repetition furthers comprehension

-More motivating for students

-Easier for students to catch up when absent

-Some geometry not covered in Dolciani

-Clever thought problems

-Kids enjoy

-Poorer students have daily successes

Weaknesses

-Hard to start in the middle of the year for transfer students

-Factoring at the end of the book

-Too much initial review of general math

-Intermingles less important topic that could be saved until the end of the book

-If book not finished, hard to go to Dolciani's Algebra II

-Too much repetition for bright ones

-More problems needed when a topic is introduced

-Non-traditional notation and covention

-Students must be motivated to read text

Teachers listed the following strengths and weaknesses of the Dolciani textbook:

Strengths	Weaknesses
-Lots of supplementary material made	-Not enough word problems
-Easier for transfers to pick up with the class	-If students fail to master a concept when it is introduced, not another chance to learn it unless they go back and review
-Better for self concept for slow students because if trouble with one concept, students can forget it next chapter	-Not enough examples
-Traditional notation	-Doesn't yield toward comprehension
	-Students can't work at own pace
	-Difficult for absent students to catch up
	-Too much emphasis on rational equations, students can't do prerequisite work

During the last week of April, the algebra classes were again observed and teachers were interviewed. At that time the Saxon classes ranged from lesson 68 to lesson 118, or from about one-half completed to nearly finishing the book. The Dolciani classes ranged from chapter 6 to chapter 10 or from half way to 83% of completing the book. The majority of teachers' comments were repetitions from the January interview.

When asked which textbook they preferred,

-Four reported Saxon

-One reported Saxon for bright and average students and Holt for slow students

-One reported either text

-One reported Dolciani

The interviews and classroom observations led the evaluator to conclude that six of the seven Algebra I teachers were making an effort to use the Saxon and Dolciani texts as requested for the study. Therefore, the scores from these teachers' students were used in the analysis of the data.

In addition, due to insufficient data, the scores from the Elementary Algebra classes were not analyzed in the report.

CHAPTER III

PRODUCT EVALUATION

Comparison of Algebra Comprehensive Exam Score Means Controlling for Pre Math Achievement

At the end of the school year the Saxon and the Dolciani algebra students were compared on their knowledge of algebra. An analysis-of-covariance design was used to statistically account for the initial differences in the mathematics achievement level that students had prior to entering algebra I. The Spring, 1981, California Achievement Test total math score was used as a covariate. The Algebra I Comprehensive Exam scores were used as the measure of algebra achievement.

Prior to using the covariance analysis two assumptions were tested. The linearity of the relationship between the CAT scores and the Comprehensive Exam scores for each group was satisfied by the use of a scattergram. The homogeneity of regression was also tested ($F = 1.69$, n.s.) and found to be tenable. As both assumptions were met, the analysis of covariance was appropriate to use. (The correlation between the CAT Math Exam and the Comprehensive Exam was .76)

The mean and adjusted mean scores of both textbook groups on the Comprehensive Exam as well as the mean CAT scores are found in Table I.

TABLE I

Mean 1980 CAT and Mean And Adjusted Mean
Comprehensive Exam Scores

Text	N	1980 CAT Mean	Comprehensive Exam	
			Obtained Mean	Adjusted Mean
Dolciani	67	61.2	18.8	18.9
Saxon	98	61.6	28.2	28.1

The covariate analysis showed that the performance of the Saxon group on the Comprehensive Exam exceeded that of the Dolciani group ($F = 46.99$, $df = 1/162$, $p < .001$).

Comparisons by each topic of the Algebra I Comprehensive Exam

The Comprehensive Exam was composed of 21 algebra topics. A multivariate t-test (Hotelling's T) was used to determine if there was a significant difference between the groups on the algebra topics. The multivariate analysis was performed on the data to adjust for the correlations among the scores on each algebra topic. The analysis also controlled for the fact that having more than one dependent variable causes univariate tests to be positively biased. The Hotelling's T resulted in the F of 10.5, with degrees of freedom 21 and 172. The probability of equal performance by the Saxon and Dolciani groups was less than one out of one hundred.

The multivariate analysis of variance showed that the two

groups performed differently on the individual topics, but did not show on which topics the difference occurred. To find out where differences were, independent t-tests were performed between the two groups on each algebra topic. The results are displayed in Table II.

TABLE II

Independent T-tests for Each Algebra Topic

	Means			Significantly Favoring	
Topic	Dolciani	Saxon	t	Dolciani	Saxon
Evaluation of Expressions	1.48	1.89	-2.68		***
Solution of Equations in one Variable	1.15	1.57	-2.92		***
Word Problems About Numbers	1.05	1.23	-1.24		
Rational Numbers (Fractions)	0.82	1.20	-3.43		***
Value Word Problems	1.34	1.60	-1.65		+
Radical Expressions	0.20	1.25	-10.41		***
Percent Word Problems	0.49	0.80	-2.73		**
Linear Equations	0.41	0.92	-4.39		***
Simultaneous Equations	0.70	1.17	-2.99		**

*** $p < .001$
** $p < .01$
* $p < .05$
+ $p < .10$

Topic	Means			Significantly Favoring	
	Dolciani	Saxon	t	Dolciani	Saxon
Uniform Motion Problems	0.48	0.60	-1.15		
Greatest Common Factor	1.13	1.73	-3.19		**
Factoring	1.14	0.84	2.23	*	
Signed Numbers	1.63	1.92	-1.91		+
Addition of Like Terms	1.31	2.19	-5.75		***
Scientific Notation	0.26	1.80	-11.35		***
Integral Exponents	0.44	1.05	-5.15		***
Reciprocals	0.2[illegible]	0.31	-1.68		+
Geometry	0.76	1.00	-1.80		+
Quadractic Functions	0.56	0.61	-0.48		
Inequalities	1.04	0.87	1.02		
Mathematical Properties	3.84	3.73	0.53		

***p < .001
**p < .01
*p < .05
+p < .10

Table II shows that the Saxon group out-performed the Dolciani group on 11 of the 21 topics; the Saxon performance was close to being significantly higher ($p < .10$) on four additional topics; the Dolciani group out performed the Saxon group on one topic; and there was no difference in group performance on five topics.

Relationship of Absences, Homework Rate and Timeblocks Missed to the Algebra I Comprehensive Exam

Three additional variables were identified at the beginning of the study as potentially having an effect on the Algebra I Comprehensive Exam scores. They were students' absences throughout the year, the number of times the algebra class period was missed due to special events such as assemblies and students' rate of completing assigned homework throughout the year. Pearson's product moment correlation coefficients were computed to determine the relationship between the Comprehensive Exam scores and absences, homework rate and timeblocks missed. Table III provides the results.

Table III

Product-moment Correlations between the Algebra I Comprehensive Exam and Absences, Homework rate and Timeblocks Missed for the Dolciani, Saxon and both groups

Comprehensive Exam Scores for:	Absences	Homework Rate	Timeblocks Missed
Dolciani	.05	-.06	.11
Saxon	-.03	.28	-.00
Both Groups	.04	.12	.10

Table III shows that with one exception there was essentially no systematic relationship between the Comprehensive Exam scores and absences, homework rate or timeblocks missed. The relationship that did occur was a low positive correlation between the Comprehensive Exam scores and the homework rate of the Saxon group. In other words, the more frequently the Saxon group turned in their assigned homework the better they did on the Comprehensive Exam. As a result of the lack of overall relationship between the Comprehensive Exam and absences, homework rate and timeblocks missed, these variables were not included as covariates in the first analysis of the data.

The average number of absences per year for the Dolciani students was 7.09 and that for the Saxon students was 8.80. The Dolciani students turned in assigned homework 89% of the time, while the Saxon students turned in homework 85% of the time.

The Dolciani classes missed an average of 8 class periods throughout the year for special events. The Saxon classes, however, missed an average of 13 class periods throughout the year. Therefore, the Saxon classes had a slightly higher absentee rate, turned in homework slightly less frequently and missed an average of 5 more class periods per year than the Dolciani classes. This evidence in addition to the low correlation coefficients, led the evaluator to conclude that absences, homework rate and timeblocks missed did not confounded with the textbook variable to produce the performance of students on the Algebra I Comprehensive Exam.

Comparison of Algebra I Comprehensive Exam Score Means by Ability Levels

To determine if the Saxon textbook was more beneficial than the Dolciani textbook at low, medium and high ability levels, a 3 x 2 analysis of variance was performed. The variables were textbook (Dolciani or Saxon) and ability level (high, medium and low). The high ability level group was composed of students who scored between the 75th and the 99th percentiles of the total mathematics subtest of the spring, 1981, administration of the California Achievement Test. The medium ability group was made up of students who scored between the 50th and 74th percentiles on the same test. The low ability group scored below the 50th

percentile on the CAT. The lower two quartiles were grouped together because there were only a few students who scored in the lowest quartile of the CAT. The mean scores of each ability group on the Algebra I Comprehensive Exam are shown in Table IV.

TABLE IV

Mean Algebra I Comprehensive Exam Scores by Ability and Textbook

	Ability Level		
Textbook	Low	Medium	High
Dolciani	7.4	20.1	24.7
Saxon	17.1	24.9	36.6

The results showed a significant difference between textbooks ($F = 25.6$, $df = 1/127$, $p < .01$), a significant difference among ability levels ($F = 39.1$, $df = 2/127$, $p < .01$) but no significant interaction between textbook and ability. A lack of significant interaction demonstrated higher performance for the Saxon group than the Dolciani group at each ability level.

Chapter IV

CONCLUSIONS

The analysis of the data led to the following conclusions:

The Saxon group out-performed the Dolciani group on the Algebra I Comprehensive Exam even after the scores were adjusted to account for the variance associated with students' initial mathematics achievement level.

When the two groups were compared on each topic of the Algebra I Comprehensive Exam, the Saxon students scored significantly higher on:

Evaluation of expressions
Solution of equations with one unknown
Rational numbers (fractions)
Radical expressions
Percent word problems
Linear equations
Simultaneous equations
Greatest common factor
Addition of like terms
Scientific notation
Integral exponents

In addition, the difference in scores was close to being significantly higher in favor of the Saxon group on:

Value word problems
Signed numbers
Reciprocals
Geometry

The Dolciani group scored significantly higher on factoring. The remaining topics showed no difference between the groups.

The Saxon classes had slightly more absences, and turned in homework slightly less frequently than the Dolciani classes. In addition the Saxon group missed an average of one and one half periods for every one class period missed by the Dolciani group.

While the homework turned in seemed to be more beneficial for the Saxon students in terms of achievement on the Comprehensive Exam, they did not turn in homework any more frequently than the Dolciani students. Additionally, the algebra teachers reported assigning approximately equal amounts of homework to both groups. So, the difference in homework benefit was probably a function of the textbook instead of a separate confounding variable. There was no relationship in either group between Comprehensive Exam scores and absentee rate or class periods missed for special events such as assemblies. Therefore, it is unlikely that differences in absences, homework, or class periods missed confounded with the textbook variable to cause the higher algebra achievement for the Saxon students.

In the last analysis the students were divided into high, medium and low ability levels by their score on the mathematics subtest of the spring, 1980, administration of the California Achievement Test. At each ability level, the Saxon students outscored the Doliciani students on the Algebra I Comprehensive Exam.

Chapter V

RECOMMENDATIONS

In light of the superior algebra achievement of those students taught with the Saxon book as well as the preference for the Saxon text by the majority of the teachers in the study, the evaluator recommends that consideration be given to using the Saxon textbook with the Algebra I classes during the 1982-83 school year. However, three problems with the Saxon book were identified by the teachers in the study.

The first problem is a side effect of one of the major strengths of the Saxon text, the distributed homework practice. Students who transfer into Algebra I during the middle of the year must learn the material covered from the previous lessons in order to complete the daily homework assignments. With the Dolciani text, transfer students need only to be taught the contents of the chapter on which the class is working because the contents of previous chapters can be forgotten with little consequence until a comprehensive exam. When using the Saxon book, the catch up period will probably require a commitment for extra work from both transfer student and algebra teacher. The teacher may need to coach the student before and/or after school. The student will need to study the beginning algebra lessons in addition to keeping up with new material from class. If transfer

students make the effort to learn the additional material, however, they will probably receive the benefits of greater algebra comprehension at the end of the school year.

A second consideration in using the Saxon textbook will be students' performance on factoring. Factoring was the only topic which the Dolciani students outscored the Saxon students. Possible explanations could be that Saxon did not introduce the factoring of trinominals until the last half of the book or that he did not explain factoring as well as other topics. To improve students' ability to factor, the evaluator recommends spending extra time on the topic and using supplemental materials to increase students' exposure to, and practice of, factoring.

As the notation and convention of the Saxon textbook differs from that of Dolciani, students will have to learn Dolciani's method if they are to take Algebra II with the Dolciani text. Extra time will have to be spent in either Algebra II or Algebra I or both in order to teach students both notation systems.

Overall, the evaluator is of the opinion that problems with implementing the Saxon textbook would seem to be worth the effort in order to achieve the higher algebra comprehension associated with the text.

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Addendum to Saxon vs. Dolciani: A Comparison of Two Algebra I Textbooks

The dependent variable used in the original report was the Algebra I Comprehensive Exam which was a locally developed, criterion referenced test. The content validity of the exam was derived from the fact that the problems were created to be like those found in the Dolciani and in the Saxon textbooks. In addition, the exam had "face" validity as indicated by the mathematics consultant finding the problems to be representative of the two textbooks. The exam was piloted with an Algebra I class not participating in the study before it was given to the students in the study.

The question was raised, however, concerning the relationship of the Algebra I Comprehensive Exam and the California Achievement Test Total Mathematics scores. A correlation (Pearsons r) was calculated between the Algebra exam and the CAT Total Mathematics scores and found to be .76. Therefore, the two exams can be said to share 58% of their variance. In other words, students who performed well on the Algebra I Comprehensive Exam were likely to score well on the CAT Mathematics Subtest.

An analysis of covariance was also computed to determine if there was a significant difference on Spring, 1982, CAT Total Mathematics scores between the Dolciani taught and Saxon taught groups. The covariate was the Spring, 1981, CAT Total Mathematics scores which were

used to account for students' mathematics achievement level prior to entering Algebra I.

Two assumptions of the analysis of covariance were tested. The relationships between the CAT Total Mathematics 1981 scores and the CAT Total Mathematics 1982 scores for each group were found to be linear by the use of scattergrams. The correlation between the two tests for the Saxon group was .83 and for the Dolciani group was .80. The homogeneity of regression assumption was also satisfied ($F=.23$, $df= 1/152$, n.s.).

The mean and adjusted mean scores and the corresponding national percentiles of both textbook groups on the 1982 CAT Total Mathematics Subtest are found in Table I.

Table I

Mean 1981 CAT and the
Mean/Adjusted Mean 1982 CAT scores

		1981 CAT		1982 CAT Obtained		Adjusted	
Text	N	Raw Score Mean	Nat'l Percentile	Raw Score Mean	Nat'l Percentile	Raw Score Mean	Nat'l Percentile
Dolci.	65	61.2	71	59.5	69	59.7	69
Saxon	91	61.6	72	63.6	75	63.3	75

The analysis of covariance showed that the Saxon group out-performed the Dolciani group on the 1982 CAT Total Mathematics subtest

(F= 7.48, df= 1/153, $p < .007$).

While students' performance on algebra concepts taught during Algebra I was and should have been the criteria by which the two Algebra I textbooks were judged, the higher achievement of the Saxon students on the California Achievement Test Total Mathematics subtest added credence to the selection of the Saxon textbook for use with district Algebra I students. In addition, the high correlation (.76) between the CAT Total Mathematics and the Algebra I Comprehensive Exam provided evidence of concurrent validity for the Comprehensive Exam. Therefore, the information provided by the Spring, 1982, CAT Total Mathematics scores added support to the conclusions and recommendations in the original Saxon vs. Dolciani report.